How do children learn to conflate manner and path in their speech and gestures?

Differences in English and Turkish

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1 Introduction

Recent research on spatial cognition renders it plausible to claim that the perceptual and cognitive organization of space is the same across cultures and languages (.e.g., Hayward & Tarr, 1995; Landau & Jackendoff, 1993). On the contrary, languages vary in terms of the way they map semantic elements (e.g., manner of movement) onto syntactic components (e.g., verbs, adverbs) (Talmy, 1985). Thus, these differences raise questions about the universality of spatial cognition and its acquisition by native speakers of different languages. This paper is an attempt to tackle these questions by examining how children from two typologically different languages--English and Turkish--learn to encode motion events in their speech and spontaneous hand gestures (McNeill, 1992; Goldin-Meadow, Alibali, & Church, 1993).

Talmy (1985) has shown that languages differ typologically in terms of the way map especially, path and manner components of a motion event onto lexical and syntactic elements. The so-called satellite-framed languages (e.g., English, German, Russian etc.) conflate motion with manner in the main verb and path is expressed by verb particles or satellites (e.g., fly *in*, *out*, *down*). However, the so called verb-framed languages (e.g., Semitic, and Romance languages such as Spanish as well as Japanese and Turkish) conflate motion with path in the main verb (e.g., Turkish: *gir* 'enter', *cik*

'exit', *in* 'descend'), and express manner in the subordinated verb (e.g., Turkish: *ucarak cikti* 'exited flying').

In recent work, Slobin et al. (e.g., Berman and Slobin, 1996; Slobin, 1987) have shown that these typological differences also influence the discourse organization of speakers using these two languages. Speakers of satellite-framed languages tend to use more manner verbs (e.g., the bird *flew* out of the hole) than speakers of verb-framed languages. Since satellite-framed languages do not prefer to encode path in the main verb, this slot is easily available for manner verbs. On the other hand speakers of verb-framed languages tend to use more path verbs (i.e., the bird *exited* the hole) than speakers of satellite-framed languages and usually omit manner since manner is subordinated to the main verb. Previous research on the development of these differences by Özçalıskan and Slobin (1999) among Turkish, Spanish (verb-framed), and English (satellite-framed) children have shown that as early as 3 years, children are attuned to the grammaticized semantic distinctions of their native language. While children of verb-framed languages (Turkish and Spanish) use more path verbs in their speech, English speaking children use more manner verbs.

In this research we examine the development of the ways both manner and path are encoded together in speech and gestures of Turkish and English-speaking children.

2 Development of manner and path conflation in speech

We first investigate preferred lexicalization patterns in children's speech in the two languages. As suggested by Talmy, there are two main ways of expressing manner and path components of a motion event together:

1) manner verb + satellite (e.g., *climbed up*)

2) path verb + subordinated manner verb (e.g., *went up climbing*)

The existence of these options presents interesting developmental questions in the linguistic encoding manner and path together. If children are initially sensitive to language specific ways of conflating manner and path we expect English children to use manner verb + satellite constructions from early on but Turkish children to use verb+verb constructions. However, if children use a universal way of mapping semantic elements onto syntactic frames, then they use similar strategies at the beginning and learn the language specific distinctions later on. Furthermore, some verbs encode manner-path conflation in another way, that is; representing both manner and path within one lexical unit, which has not been taken into consideration in Talmy's framework before:

3) manner-path conflated verb (e.g., Turkish: *tirman* 'climb up')

This way of conflation presents another puzzle for children acquiring a particular language type. That is, even if they are sensitive to language specific typological patterns early on, it still remains a question as to how the more specific patterns that do not fit the general typology are learned by children; for example, whether these lexical forms are acquired later in development. According to Bowerman (1982), children's late errors reflect child's strategies of isolation or 'differentiation' of semantic elements such as Cause *covertly* expressed in verbs. The acquisition of manner-path conflated verbs might reveal a similar phenomena. That is, Turkish children might initially represent semantic components of manner and path separately with regard to these specific motion events and learn to express them within one lexical unit later in development.

To answer these questions we analyze Turkish and English children's motion event expressions used in narratives developmentally.

2.1 Sample and Procedure

The sample comes from an already collected set of data collected from children aged 3 to 11 and adults, using a picture story book, *Frog, where are you ?* (Mayer, 1969) in a variety of languages (see Berman and Slobin, 1994)[1]. We used the data from English and Turkish-speaking children in ages 3, 6, 9, and adults. The number of subjects in each age group range between 30 and 50.

The procedure is same across languages and ages. Subjects are asked first to look through the entire picture book and then tell the story while looking at the pictures. Each interview is audiotaped. The data are further coded for motion events using the system developed by Slobin and his colleagues (1997).

2.3 Results

Use of manner and path verbs in English and Turkish across ages

First we look at the overall difference between English and Turkish speakers in terms of their lexicalization choices in encoding manner and path. We calculate the percentage of five different lexicalization types[2]: 1) manner

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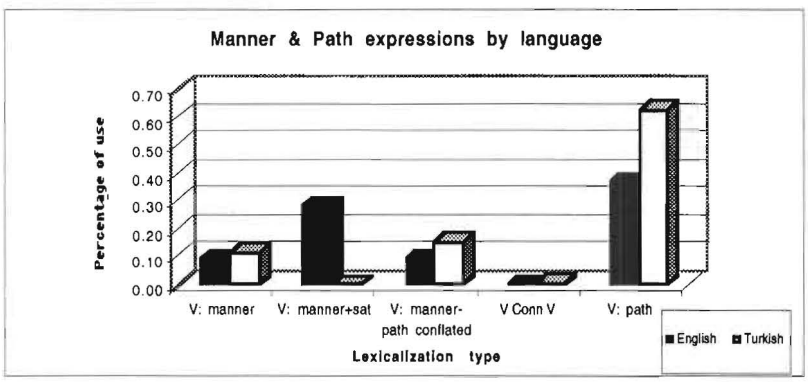
[1] The Turkish data were gathered by Ayhan Aksu-Koc and Aylin Küntay in Istanbul and in Tarsus by MehmetAli Akinci. The English data were collected by Virginia Marchman and Tanya Renner in Berkeley and by Gillian Wigglesworth in Australia.

[2] Percentages were computed by dividing the total number of verbs within each type by the total number of motion verbs used. The total motion event verbs also included bare change of location verbs such as "go" and "move" as well but we did not include their percentages into our analysis since they encode neither manner, nor path. That is the reason why the total percentages of each type do not add up to 100% in Figure 1 and Table 1.

only verbs (V:manner), 2) path only verbs (V:path), 3) manner verb + satellite (V: manner+sat.) 4) path verb + subordinated manner verb (V :V) and lastly 5) verbs that conflate manner and path within one lexical item (V: manner-path conflated) (see Figure 1) .

The results reveal overall differences in the way Turkish and English speakers express manner and path elements. The largest difference is with regard to the use of path only expressions. As expected percent use of path only verbs is much higher in the Turkish sample than in the English one (63% to 37%). There is no difference in manner only verbs. However, the overall encoding of manner (adding the use of manner only verbs, manner verb+satellite constructions and manner-path conflated verbs together) is more frequent among English speakers than in Turkish speakers (49% to 29%). These findings fit with the previous findings reported by Özçalıskan & Slobin (1999). However, there are further interesting differences found in terms of the way manner and path were expressed together. As expected from the typology, English speakers prefer manner verb+satellite constructions most frequently (29%) among the three possible conflation possibilities. However, in the Turkish sample, contrary to the expectations, the choice of path verb + subordinated manner verb constructions are not preferred at all (1%). This is rather interesting since according to Talmy's typology, Turkish speakers are expected to use verb+verb constructions to express manner and path together. On the other hand, Turkish speakers mostly use manner-path-conflated verbs (16%) and more than English speakers do (10%) and this seems to compensate for this difference. Overall we have found differences among how manner and path elements are expressed lexically and syntactically between the two languages in ways that fit and also go beyond the typology proposed by Talmy (1985).

Figure 1. Percentage use of different lexicalization types in Turkish versus English sample (adults and children combined)



Use of manner and path verbs in English and Turkish by age

The aim of the next analysis is to investigate how these overall differences emerge developmentally. We calculate the percentage use of the four lexicalization types[3] in each sample across ages (Table 1).

No major developmental patterns emerge in children's choice among different lexicalization options in either of the languages. The manner verb+satellite construction which is typologically specific to English is acquired as early as 3 years and its frequency does not increase by age. There is slight increase in the use of manner-path conflated verbs at 9 years of age. In the Turkish sample, language specific forms, such as the frequent use of path only verbs are acquired as early as 3 years of age. The manner-path conflated verbs are also acquired quite early and furthermore at 3 years they are much more frequently used by Turkish-speaking than by English- speaking children (14% to 5 %). This difference mirrors the fact that Turkish adults use this form more frequently than English speaking adults.

Table 1: The percentage use of different lexicalization types by English (E) and Turkish (T) speakers by age

	V:manner only		**V:manner+ satellite**		**V:manner-path conflated**		**V: path only**	
	E	**T**	**E**	**T**	**E**	**T**	**E**	**T**
3 yrs	13%	8%	36%	---	5%	14%	39%	71%
6 yrs	8%	10%	24%	---	9%	11%	41%	70%
9 yrs	10%	14%	22%	---	15%	23%	36%	52%
Adult	10%	16%	32%	---	11%	17%	33%	59%

There is again an increase in the use of manner-path conflated verbs by 9 years, around the time of which there is a slight decrease in path only verbs.

Overall the findings show that speakers of different languages encode manner and path together in different ways and that children speaking these languages are sensitive to these differences beginning from 3 years. Furthermore the lexicalization types that do not fit the general pattern are also acquired early suggesting that children do not go through a stage of differentiating the covert semantic elements in these expressions as observed by Bowerman (1982).

[3] We left V :V constructions out of the analysis since there were very few overall.

3 Development of manner and path conflation in gesture

If children are sensitive to the language specific encoding of manner and path early on, how do children born to different languages learn to conceptualize elements of motion events? In order to investigate this question we analyze spontaneous gestures that speakers use during speaking to gain further insight into speakers' spatial thinking patterns.

Conversational and narrative speech is often accompanied by movements of the arms and hands that are termed as 'gestures'. Some of these hand gestures that speakers use reveal their imagistic representations during speaking. For example a circular hand gesture representing the shape of a table accompanying the mention of a table in speech provides information about speaker's mental image of the table at the moment of speaking (McNeill, 1992; Goldin-Meadow, Alibali, Church, 1993). In the literature these are called iconic gestures; a class of relatively unconventionalized hand gestures that have a formal resemblance to the referents they represent.

According to McNeill (1992) iconic gestures and speech reflect different parts of one underlying unit of mental processing; both visuo-spatial cognition as manifested in gestures and linguistic content as manifested by the structural and lexical possibilities of languages. When languages differ in their structural and lexical possibilities, there is a corresponding difference in the visuo-spatial content of thought, and this is manifested in gestures. Similarly, Kita (in press) has also proposed that gestures are generated out of the dynamic interplay between between spatial imagery and the generation of linguistic messages (Interface Hypothesis). Due to this dynamic interface, gestures are shaped both by the available linguistic expressions in a particular language and the raw spatial imagistic information to be conveyed. The gesture is shaped "so as to make its informational content as compatible as possible to linguistic encoding possibilities" while trying to retain the aspects of the raw spatial imagery.

Previous reserach by Kita and Özyürek (under review) and Özyürek and Kita (1999) has provided evidence for this hypothesis. This research has shown that Japanese, Turkish, and English adult speakers' gestures that depict the same motion event differ in ways paralleling the linguistic encoding of semantic elements within each language as well as show similarities retaining the aspects of the raw imagery. As mentioned above, Turkish and Japanese differ from English in the lexical and clausal packaging of manner and path. The English description of manner and path requires only one verb with a satellite (e.g., rolls down), whereas both Turkish and Japanese require two verbs (e.g., yuvarlanarak iniyor (descends rolling)) due to the typological differences mentioned above. In one study, Turkish, Japanese, and English adult subjects were shown one motion event scene that included

both manner and path. In this scene a cat rolls down a hill after having swallowed a big bowling ball. For the descriptions of this scene equal number of speakers in all three languages use Manner-Path Conflated gestures at least once (e.g., hand rotates as it moves across the gesture space). This type of gesture represents the scene as perceived, retaining all aspects of the raw imagery. However, in addition, more Turkish and Japanese speakers compared to English produce a) Manner-only gestures (e.g., hand rotating in the same location), and b) Path-only gestures (e.g., hand moving across space without any rotation) at least once in their descriptions. Thus gestures index differences in conceptualization of motion events in ways paralleling the lexicalization patterns in different languages. While more Turkish speakers are likely to conceptualize manner and path of a motion event as separate components, English speakers conceptualize the two components as one unit during on-line speaking.

If speakers' iconic gestures are sensitive to the syntactic packaging of motion events, then how do these gestural differences that index different ways of conceptualization arise developmentally? One possible developmental pattern is that children's gestures represent information in different ways initially and get tailored to the specific linguistic encoding patterns later. The other possibility is that gestures are influenced by the language specific encoding of semantic elements very early on. In order to answer these questions we examine the development of Turkish children's' gestures used to describe the same motion event we used in the previous study (Kita & Özyürek, under review)) and compare the gestural patterns with those we obtained from the Turkish adult speakers.

3.1 Sample and Procedure

Sixteen adult, eleven 9 year-old, and eighteen 6 year-old Turkish speakers participated in the study. All the data was collected from monolingual speakers in Istanbul, Turkey.

Each subject is asked to see an animated cartoon 'Canary Row' (8 minutes) and to narrate the cartoon story to an addressee who has not seen it. The narratives are videotaped.

3.2 Coding

Speakers' gestures that accompany verbal expressions of the scene where Sylvester, the cat rolls down a hill are categorized into 3 types as has been done in the Kita & Özyürek study: (1) Manner-only gestures, (2) Path-only gestures, and (3) Manner-Path Conflated gestures (see above for examples of these gestures)

3.3 Results

We calculate the percentage of speakers who use any of the three types of gestures at least once in each age group (Figure 2), since many of the speakers use more than one gesture in their descriptions.

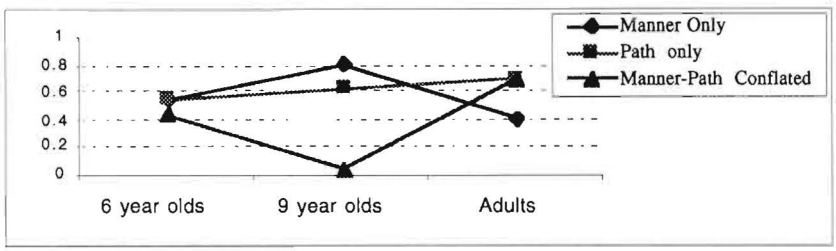


Figure 2: Percentage of Turkish speakers who used each type of gesture at least once in their descriptions at different ages.

As one can see in the above figure, the percentage of speakers who use three types of gestures in the 6 year old group is very similar to the percentage of adult speakers who use these gestures. However, at 9 years there seems to be a reorganization in the type of gestures used. At 9 years, the percentage of speakers who use Manner only gestures increases (55% to 81%) and who use Manner-Path Conflated gestures decreases (40% to 5 %). This overuse of Manner only gestures, but decrease in Manner-Path Conflated ones might index an increased sensitivity to the typologically specific linguistic encoding of manner in 9 year-olds' conceptual representation (i.e.,conceptualizing manner as a seperate mental unit). There seems to be increased cross-modal interaction between the representations in speech and gestures at around 9 years.

Overall, the development of gestural representations reveal that spatial thinking patterns about the manner and path elements of motion events are organized in tune to the linguistic encoding of semantic elements as early as 6 years of age. Further study is needed however to find out the patterns at 3 years and a comparative study with English-speaking children to obtain conclusive results.

4 Conclusion

In this paper we attempt to show evidence for the fact that children who are born into typologically different languages are very sensitive to the language and lexical specific encoding of spatial elements of motion events. This sensitivity is revealed both at the linguistic encoding level and the gestural representation of spatial elements. This correlation suggests that in spite of the seemingly universal organization of space, children born into different languages organize their spatial thinking in different ways to meet the demands of the linguistic encoding possibilities of their language.

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